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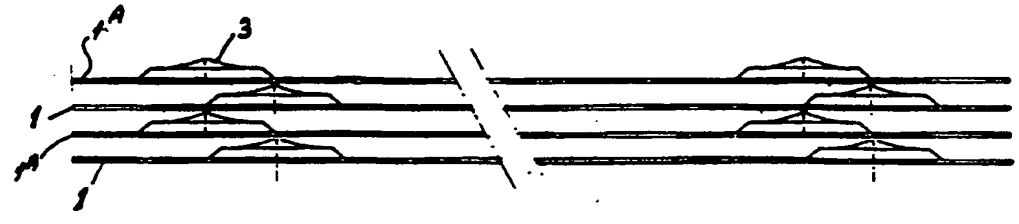
(54) Title: SET OF PLATES FOR A HEAT-REGENERATOR



(57) Abstract: The invention concerns a set of heat-exchange plates (1) for a heat regenerator which serves as storage of heat obtained from a stream of hot gasses. The stored heat is later used to raise the temperature of cold gasses. The plates (1) are provided with a pattern of regularly spaced dimples (2). The pattern is kept asymmetric in relation to the length of the plate (1) so that the distances (3) and (4) are different. By stacking the plates (1) back to front, the dimples (2) stagger. When pressing the set of plates (1) somewhat together a waveform is created in the plate (1) which increases the efficiency of the set plates.

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Set of plates for a heat-regenerator.

The invention concerns a set of heat-exchange plates for a heat regenerator which serves as storage of heat obtained from a stream of hot gasses. The stored heat is later used to raise the temperature of cold gasses.

Heat regenerators are known from air-conditioning installations for buildings where two regenerators are sequential used as heat-collector and heat supplier. With these systems are very high efficiencies to be realised.

A problem is the amount of material which is necessary to storage a reasonable amount of heat. Known are metal plates which are foreseen of a light wave-like form and with small space in between are placed in a case. There is the practical problem to keep the plates straight and constant distance.

The invention solves this drawback by having a dimple pattern in the plates. The plates are foreseen with a asymmetric pattern of dimples where the mutual distance is determined by the thickness of the plate. It is found that the pattern of dimples has a beneficial effect on the transfer of heat from gas to plate and vice versa. By pressing the set of plates somewhat together a wave-like form is created in the plate which increases the efficiency of the set plates.

It is found that with thinner plates a reduction of weight of about 20 percent is obtained with the same capacity.

Description of the invention.

Fig. 1 shows a plate.

Fig. 2 shows a detail of a dimple.

Fig. 3 shows a detail of the plates in mutual relation.

Fig. 4 shows a second variant of the form of a dimple.

Fig. 5 shows a third variant.

Fig. 6 shows a fourth variant.

In fig. 1 is the plate indicated with (1). In plate (1) are pressed dimples (2) with regular distances in a pattern. By keeping the pattern asymmetric in relation of the length of the plate the end distances (3) and (4) are different. In reality the difference between distances (3) and (4) is somewhat more than half of the diameter of the dimples. By stacking the plates back to front the dimples (2) stagger and the plates are hold at the desired distance. In Fig. 2 is shown a cross section over a part of the set of plates. With (1a) is indicated the plate which is stacked back to front. The thickness of the set plates is determined by the number of plates being stacked. An example is a set of plates of 88 dimpled plates and a flat closing plate of 360 x 360 x 940

millimetre with a weight of 48 kilogram. The Plates (1) are made of aluminium and 0,6 millimetre thick. To prevent corrosion the plates (1) are anodised.

In Fig. 3 is indicated with (3) a form of a dimple (2). Dimple (3) has the form of a cone with a hollow point.

In Fig. 4 is a variant of dimple (3) in the form of a spherical dimple (4).

In Fig. 5 is indicated with (5)a variant of dimple (2), in this case an elongated, slanted dimple, which causes a oscillating flow of gasses.

In Fig. 6 are dimples indicated which have the form of a turbine blade to vary the course of the flow of gas.

It is found that the dimples (2) causes a favourable disturbance which ameliorate the transfer of the heat.

The compressing of the set of plates causes a wave-like form of the plates (1) that also results in increasing the working.

Claims.

1. Set of plates for a heat-regenerator characterised by that the set is stacked from plates (1) which are foreseen with a asymmetric pattern of dimples (1, 2, 3, 4, 5, 6) where the dimples (1, 2, 3, 4, 5, 6) are devided uniform on the surface of the plate (1), where plates (1) and (1a) are placed back to front and the complete set is pressed together where a wave-like form in the plates (1, 1a) is created.

2. Set of plates as in claim 1 characterised by that the dimples (3) have the form of a cone with a hollow point.

3. Set of plates as in claim 1 and 2 characterised by that the dimples (4) are spherical in form.

4. Set of plates as in claim 1, 2 and 3 characterised by that the dimples (5) are elongated and placed slanted.

5. Set of plates as in claim 1, 2, 3 and 4 characterised by that the dimples (6) have the form of a turbine blade.

6. Set of plates as in claim 1, 2, 3 and 4 characterised by that the set plates after stacking is pressed together in such a way that a wave-like form is created in plates (1).

* * * *

FIG 1

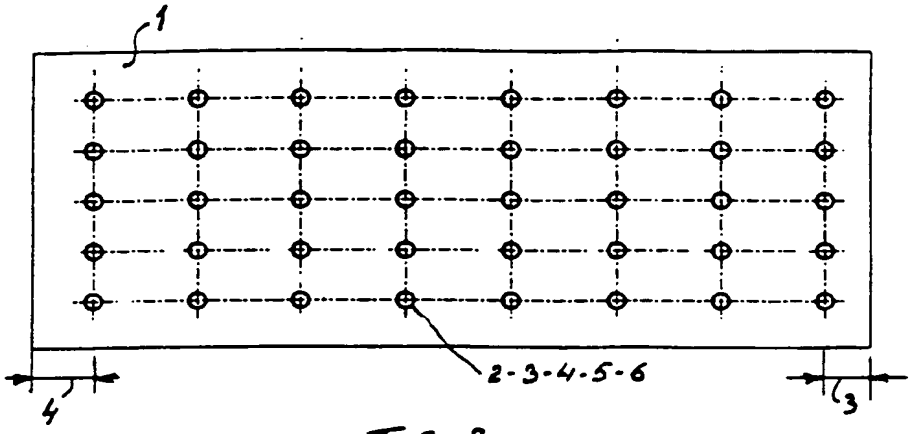


FIG 2

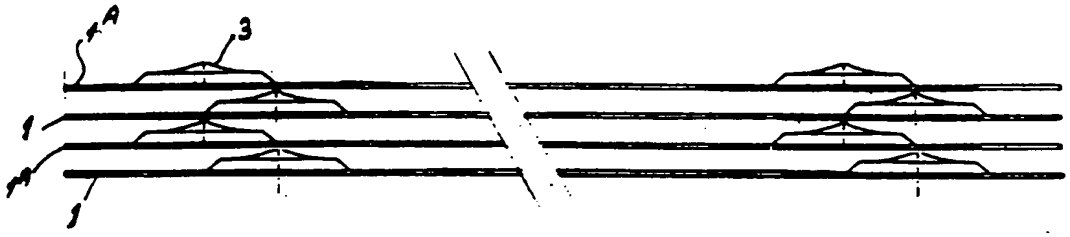


FIG 3

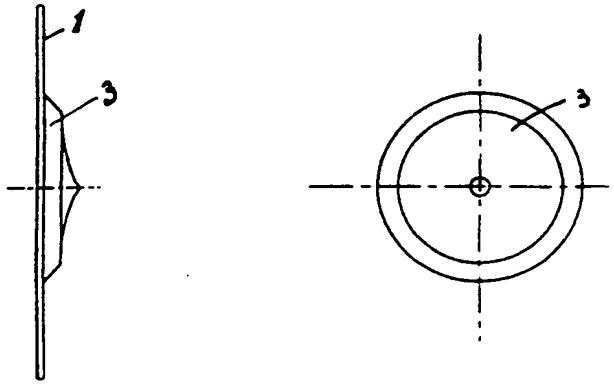


FIG 4

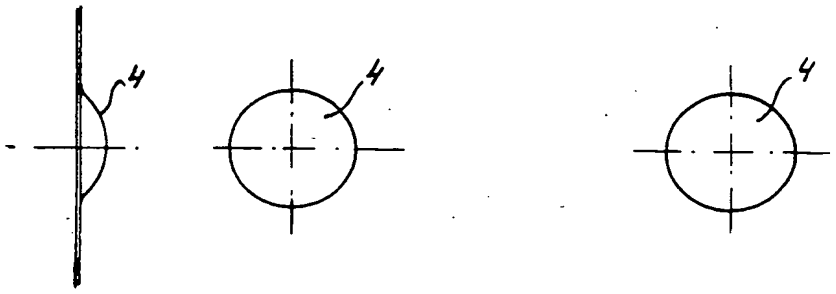


FIG 5

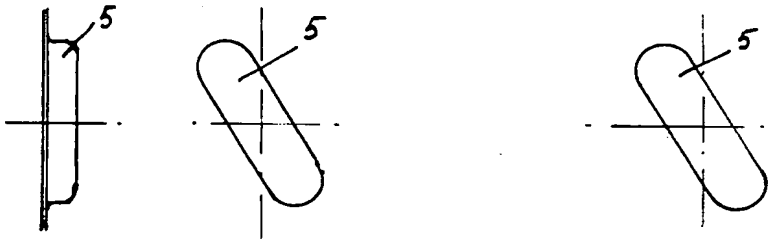
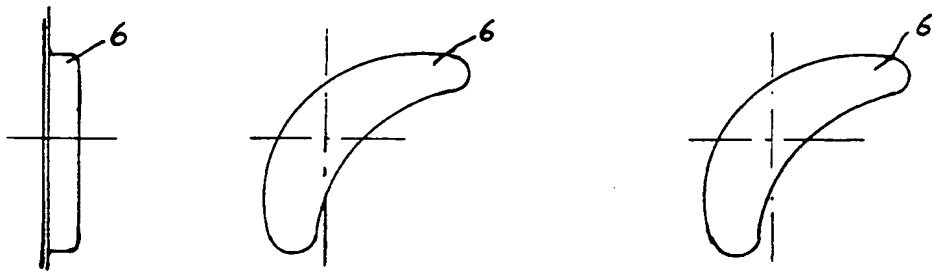


FIG 6



INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/NL 00/00694

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F28D19/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 F28D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	US 3 921 713 A (SCHNITZER EMANUEL ET AL) 25 November 1975 (1975-11-25) column 2, line 37 - line 46; figures	2-5
A	US 3 463 222 A (GRAMES LLOYD DONALD) 26 August 1969 (1969-08-26) the whole document	1-3
A	GB 2 099 740 A (MATERIAL SCIENCES CORP;RAUSCH JOHN JACOB; THYNE RAY JOSEPH VAN) 15 December 1982 (1982-12-15) page 5, line 80 - line 96; figures 13-15	1-3

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
6 February 2001	12/02/2001

Name and mailing address of the ISA	Authorized officer
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 109 525 A (NORTHERN SOLAR SYSTEMS INC) 2 June 1983 (1983-06-02) abstract; figures	1-5
A	US 3 910 344 A (HAGEN ROBERT J) 7 October 1975 (1975-10-07) column 4, line 3 - line 22 column 5, line 38 - line 51; figures	4

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